**Section A**

Troubleshooting the Control Card (using a Multimeter).
*Power Supply disconnected!!!*

The following tests have to be made without connected cables.

1) **Internal Resistance - Digital Inputs:**

- **Low Water**
  X3/1 (GND) - X3/11
  => 90k Ω / 2.5M Ω

- **External ON/OFF (release)**
  X3/1 (GND) - X3/7 => 14k Ω

- **Configurable Digital Input (Digi 1):**
  X3/1 (GND) - X3/9 => 14k Ω

- **Digital Inputs (Dig 2 /Dig 3 /Dig 4):**
  X3/1 (GND) - X3/5 / 6 / 15
  => 20k Ω

2) **Internal Resistance of the Analogue Current Inputs:**

- (Sensor 1/2 - Req. Val 1/2)
  X3/1 (GND) - X3/2 / 4 / 18 / 23 => 50 Ω

3) **Capacity of Electronic Ground to Earth:**

- X3/1 (GND) - earth => 60nF
  Important to bleed off Hf- Disturbances!

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**Additional power supply** **max. 100 mA**

- **Current signal input (required val. 2)**
  0-20mA / 4-20mA [Ri=50Ω]

- **Analog output 2** 4-20mA [Ri=500Ω]

- **Analog output 1** 0-10 VDC

- **Current signal input (required val. 1)**
  0-20mA / 4-20mA [Ri=50Ω]

- **Voltage signal input (required value 2)**
  0-10 VDC *DIG 4

- **Voltage signal input (required value 1)**
  0-10 VDC

**Low water**

- **Configurable digital input 1** DIG 1

- **External ON/OFF (release)**

- **Actual-value-voltage input sensor 1** *DIG 2

- **Actual-value-voltage input sensor 2** *DIG 3

- **Actual-value-current input sensor 2**

- **Sensor supply** **max. 100 mA**

- **Actual value current input sensor 1**

Ground
Section A (continued)

Troubleshooting the Control Card (using a Multimeter).
Power Supply disconnected!!!

Note

When the HYDROVAR is connected to power supply, the components of the power unit as well as certain Components of the Control Card remain under voltage.

Touching these components seriously endangers life!
All work, carried out at opened HYDROVAR, must be performed by qualified and authorized technicians.

The following tests have to be made without connected cables.

1) Sensor Power Supply:
   X3/1 (GND) – X3/3 => 24 VDC
   X3/1 (GND) – X3/24 => 24 VDC

2) Internal Ref. for Analog Output:
   X3/1 (GND) - X3/19 => 10 VDC

3) Digital Inputs:

   External On/Off      X3/ 7 - X3/8 (GND) => 5 VDC
   Conf. Digital Input 1 X3/ 9 - X3/10 (GND) => 5 VDC
   Low Water            X3/ 11 - X3/12 (GND) => 5 VDC
Section B

Troubleshooting the Rectifier and the IGBT Module (using a Multimeter).

*Power Supply disconnected!!!*

Single Phase Unit HV 2, 3 HP
Check the following values:

<table>
<thead>
<tr>
<th>Black Wire (GND)</th>
<th>Red Wire of Multimeter</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rectifier Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1 N DC+</td>
<td></td>
<td>OL (Overload)</td>
</tr>
<tr>
<td>L1 N DC-</td>
<td></td>
<td>0.54 V</td>
</tr>
<tr>
<td>DC+ L1 N</td>
<td></td>
<td>0.57 V</td>
</tr>
<tr>
<td>DC- L1 N</td>
<td></td>
<td>OL (Overload)</td>
</tr>
<tr>
<td><strong>IGBT Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC+ U V W</td>
<td></td>
<td>0.48 V</td>
</tr>
<tr>
<td>DC- U V W</td>
<td></td>
<td>OL (Overload)</td>
</tr>
<tr>
<td>U V W DC+</td>
<td></td>
<td>OL (Overload)</td>
</tr>
<tr>
<td>U V W DC-</td>
<td></td>
<td>0.45 V</td>
</tr>
</tbody>
</table>

**NOTE:** Put multimeter on diode check (→).  

**Result:**  
- If the above mentioned values between power supply and DC part are significantly different  
  => **Rectifier** may be damaged.  
- If values between motor connection and DC part are significantly different  
  => **IGBT** module may have a failure.
Three Phase Unit HV 3, 5 HP

Rectifier

AC Input

L1
L2
L3

IGBT

+ DC

Motor

L1 L2 L3 U V W

DC –

DC +
Check the following values:

<table>
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<th>Red Wire of Multimeter</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rectifier Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1 L2 L3</td>
<td>DC+</td>
<td>OL (Overload)</td>
</tr>
<tr>
<td>L1 L2 L3</td>
<td>DC-</td>
<td>0.40 - 0.54 V</td>
</tr>
<tr>
<td>DC+</td>
<td>L1 L2 L3</td>
<td>0.40 - 0.54 V</td>
</tr>
<tr>
<td>DC-</td>
<td>L1 L2 L3</td>
<td>OL (Overload)</td>
</tr>
<tr>
<td><strong>IGBT Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC+</td>
<td>U V W</td>
<td>0.420 - 0.635 V</td>
</tr>
<tr>
<td>DC-</td>
<td>U V W</td>
<td>OL (Overload)</td>
</tr>
<tr>
<td>U V W</td>
<td>DC+</td>
<td>OL (Overload)</td>
</tr>
<tr>
<td>U V W</td>
<td>DC-</td>
<td>0.40 - 0.45 V</td>
</tr>
</tbody>
</table>

**NOTE:** Put multimeter on diode check ( ).

**Result:**

- If the above mentioned values between power supply and DC part are significantly different => **Rectifier** may be damaged.

- If values between motor connection and DC part are significantly different => **IGBT** module may have a failure.
Xylem ['zɪəm]

1) The tissue in plants that brings water upward from the roots;  
2) a leading global water technology company.

We're a global team unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

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